(12) UK Patent (19) GB (11) 2 320 345 (13) B

(54) Title of Invention

Portable computer apparatus

(51) INT CL[6]; G06F 1/32, G09G 3/34

(21) Application No
9803349.1

(22) Date of filing
12.12.1996

(22) Date Lodged
17.02.1998

(62) Divided from Application No. 9625801.7 under Section 15(4) of the Patents Act 1977

(43) Application published
17.06.1998

(45) Patent published
18.11.1998

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(52) Domestic classification
(Edition P)
G4A AKS ASX

(56) Documents cited
EP0609843 A1
EP0474231 A2

(58) Field of search

As for published application 2320345 A *viz:*
UK CL(Edition P) G4A ADT AKS ASX
INT CL[6] G06F 1/32, G09G 3/34 3/36 3/38
updated as appropriate

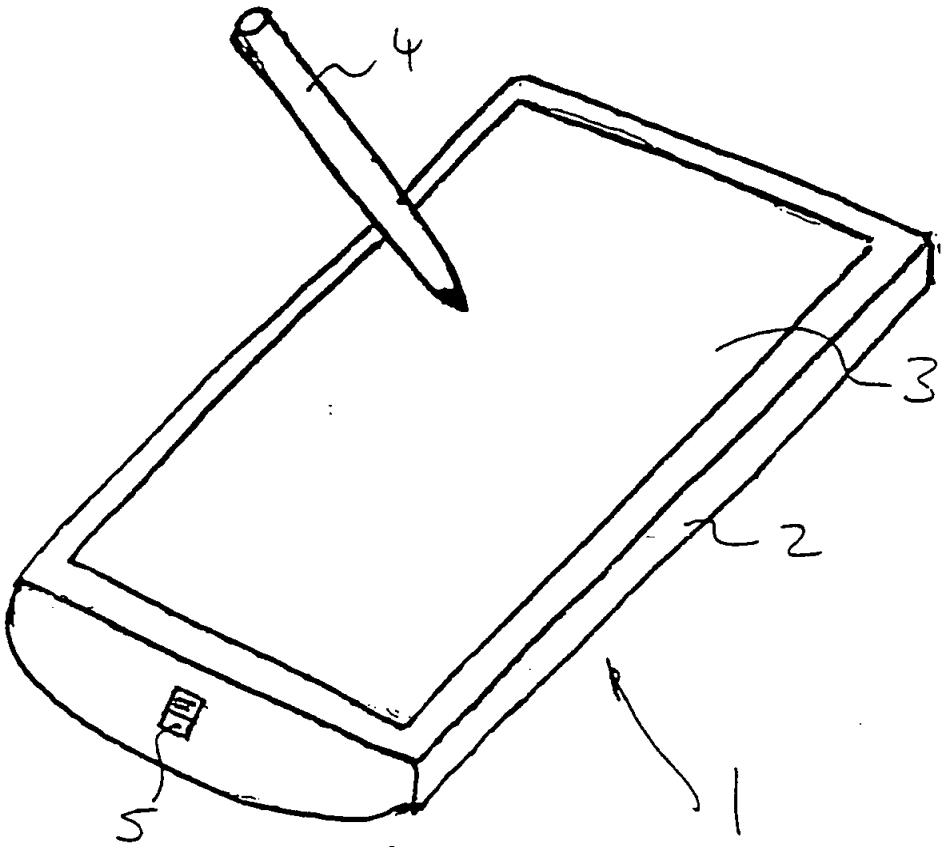

Fig. 1.

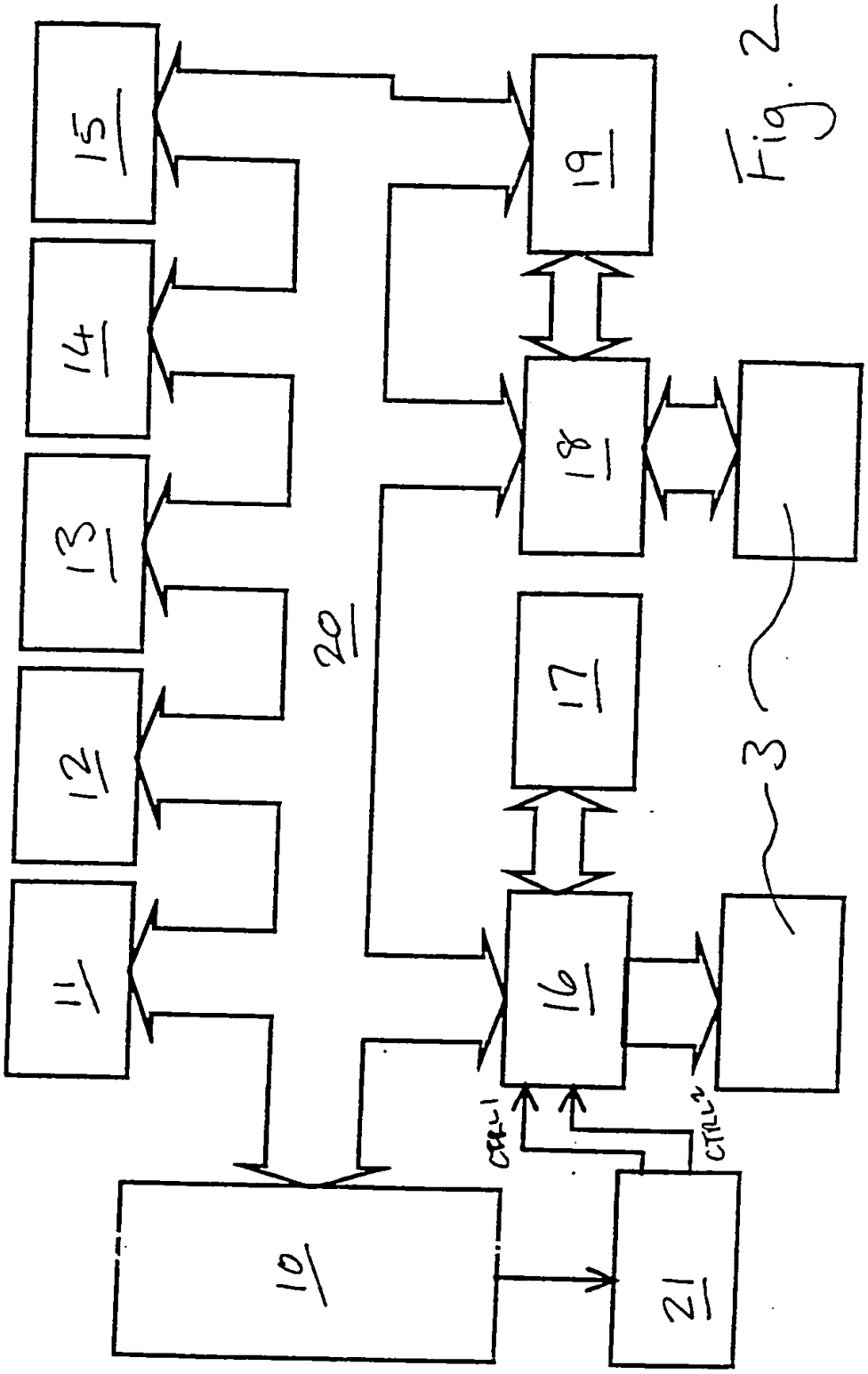

Fig. 2.

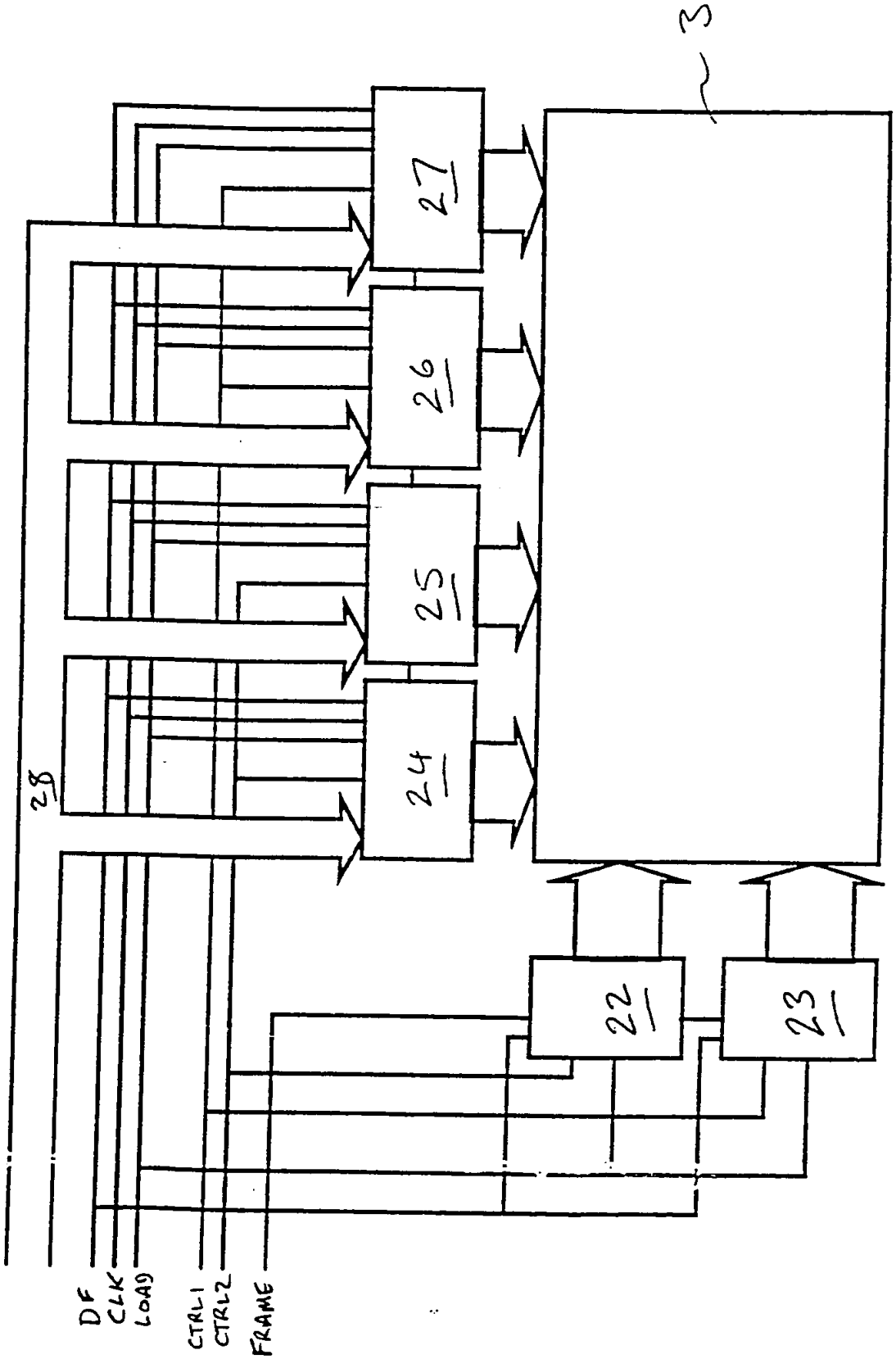

Fig. 3.

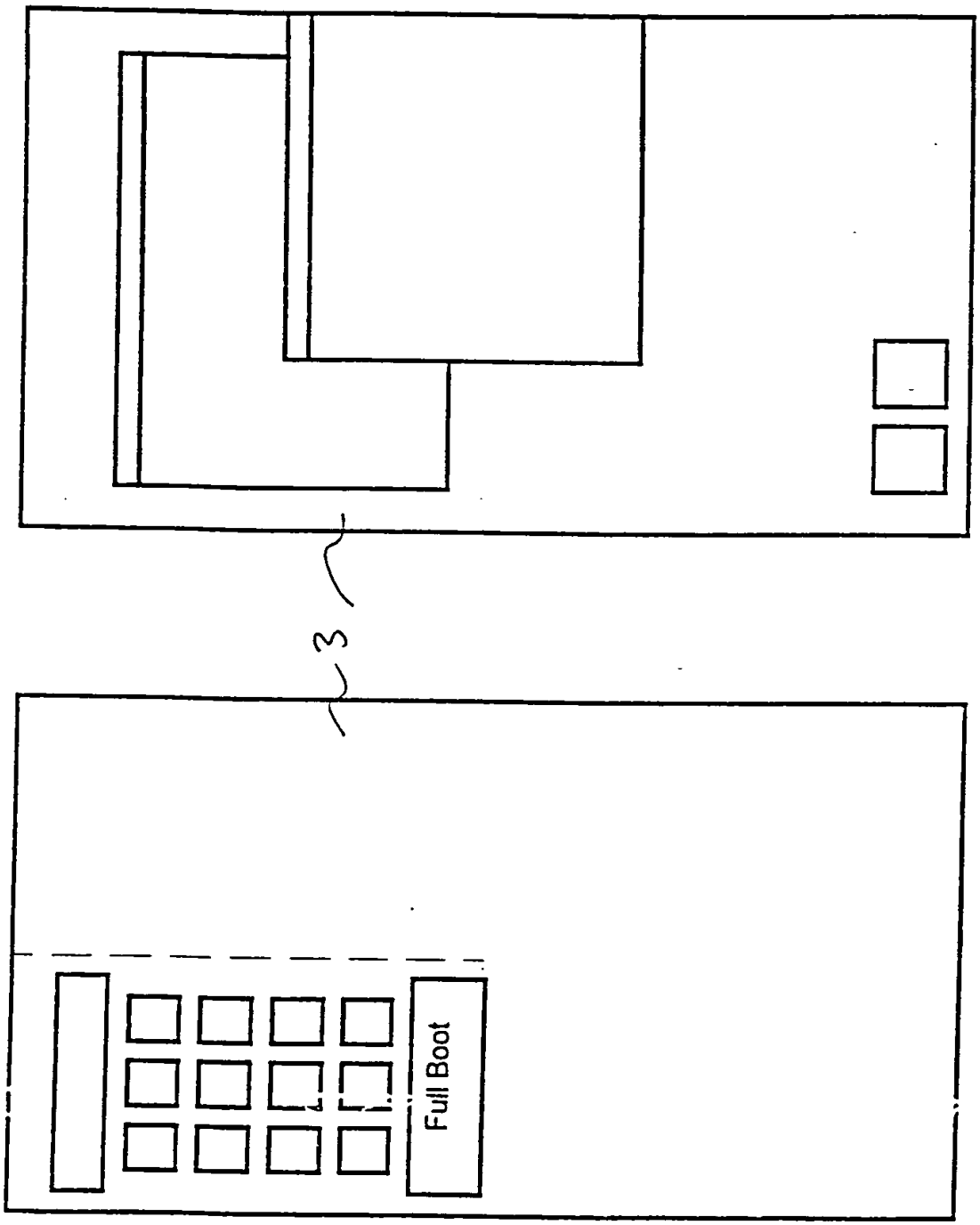

Fig. 4.

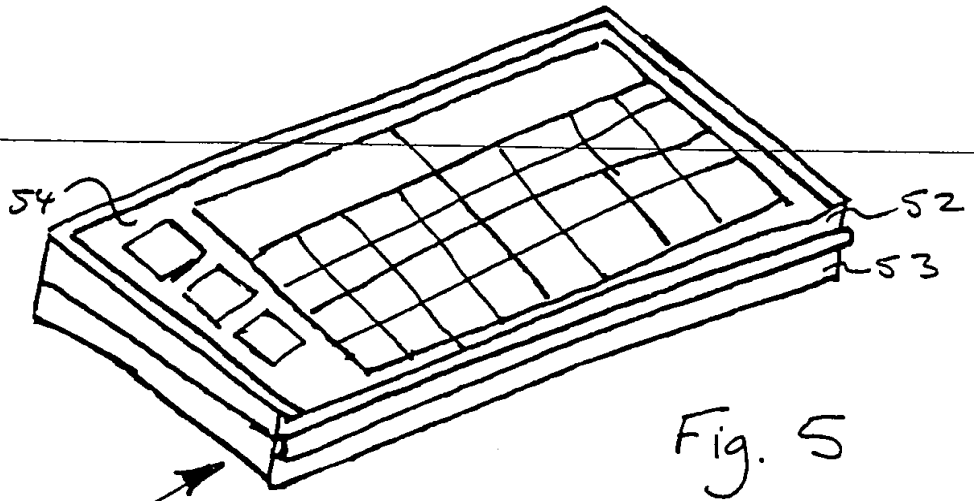

Fig. 5

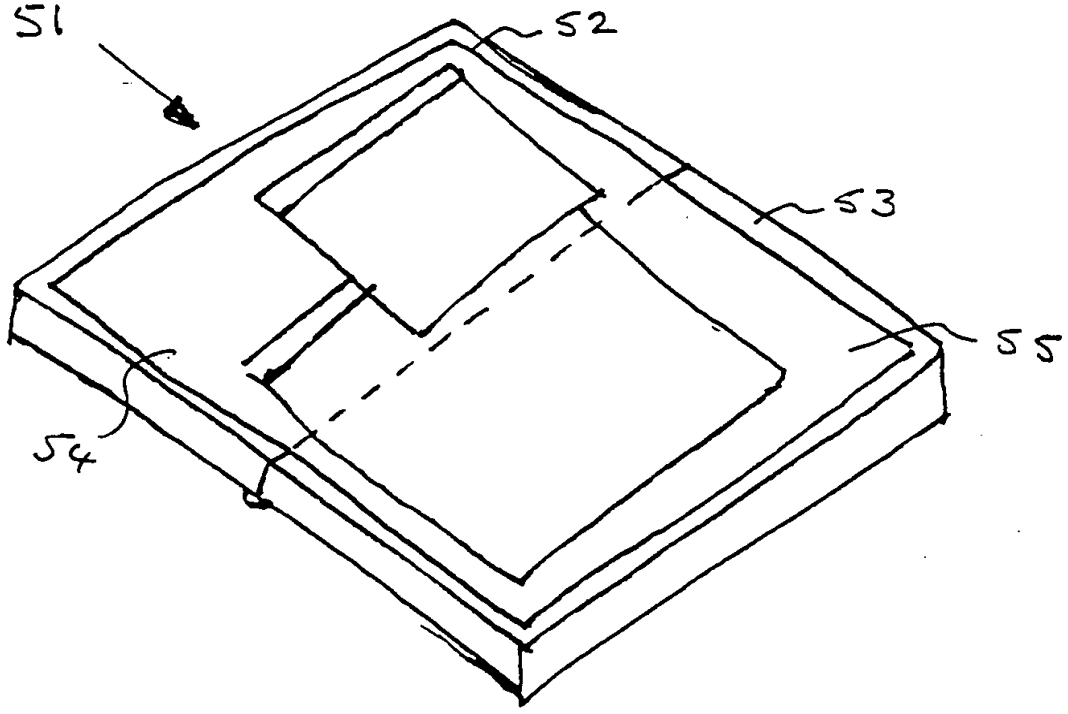

Fig. 6

Portable Computer Apparatus

Description

The present invention relates to portable computer apparatus.

Portable computer apparatus is generally powered by batteries. One problem with conventional batteries is that total battery life must be balanced against weight. For instance, it would be possible to build a portable computer apparatus that could operate continuously for a month. However, the weight of batteries required would deprive the computer of its portability.

The displays of portable computers are relatively power-hungry, particularly in the case of back-lit LCDs. This problem has been addressed by providing a display time-out function whereby the display is turned off if no user inputs are received for a predetermined period.

Another proposed solution is given in EP-A-0 474 231. The document proposes shrinking the displayed image if no user inputs are received for a predetermined period. Consequently, the power demanded by the display is reduced.

A disadvantage of this approach is that the whole of the display must be used when a user is inputting commands or data, regardless of whether the full display is necessary for the task in hand.

It is an aim of the present invention to overcome the afore-mentioned disadvantages of prior art portable computer apparatus.

According to the present invention, there is provided a portable computer apparatus comprising a display, user input means and processing means operable to display first information full-size using the whole of the display and, to reduce power consumption, using only a portion of the display, wherein the processing means is

responsive to an operation of the user input means to perform data processing associated with an imaged displayed using said portion of the display when only said portion of the display is being used without causing the whole of the display to be used.

Preferably, the display comprises a back lit liquid crystal display panel and only said portion is lit when only said portion of the display is being used.

Preferably, the user input means includes a digitizer tablet means and pen. More preferably, the digitizer tablet means overlies the display.

Such an apparatus preferably comprises first and second hingedly coupled body portions and the display is distributed between the body portions.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows a PDA according to the present invention;

Figure 2 is a block diagram of the electronic circuitry of the PDA of Figure 1;

Figure 3 is a more detailed block diagram of the display in its associated driving circuitry of the PDA of Figure 1;

Figure 4 illustrates the display of the PDA of Figure 1 in two modes.

Figure 5 shows a folding PDA according to the present invention in its folded configuration; and

Figure 6 shows the PDA of Figure 5 in its open configuration.

Referring to Figure 1, a personal digital assistant (PDA) 1 comprises a moulded plastic body 2 and a combined digitiser tablet/LCD panel 3 set into one face of the body 2. A pen 4 is provided for use with the combined digitiser tablet/LCD panel 3. A power on/off switch 5 is located in an end face of the body 2.

Referring to Figure 2, the electronic circuitry of the PDA 1 comprises a microprocessor 10, a read only memory (ROM) 11 a random access memory (RAM) 12, a PCMCIA card interface 13, a serial port interface 14, a parallel port interface 15, liquid crystal display control circuit 16, a video random access memory (VRAM) 17,

a digitiser tablet controller 18 and an analogue digital converter (ADC) 19. The microprocessor 19, the ROM 11, the RAM 12, the card interface 13, the serial port interface 14, the parallel port interface 15, the liquid crystal display control circuit 16, the digitiser tablet controller 18 and the ADC 19 are interconnected by a data/address bus 20. Parallel connections are provided between the liquid crystal display control circuit 16 and the VRAM 17, and between the digitiser tablet controller 18 and the ADC 19. The liquid crystal control circuit 16 is also connected to the LCD part of the panel 3, and the digitiser tablet control circuit 18 is connected to digitiser tablet part of the panel 3. The microprocessor 10 is additionally coupled directly to power control circuit 21. The power control circuit 21 is arranged to switch the supply of power to light sources for back-lighting the panel 3. The power control circuit 21 also supplies CTRL 1 and CTRL 2 line signals to the liquid crystal display control circuit 16. The purpose of these signals will become apparent from the following description. The PDA 1 may be provided with a hard disk drive.

Referring to Figure 3, the LCD panel control circuit 16 comprises first and second command drivers (e.g. MSM 5298 devices produced by Oki Electric Industry Company) 22, 23 and first, second, third and fourth segment drivers (e.g. MSM 5299 devices produced by Oki Electric Industry Company) 24, 25, 26, 27. Data, representing an image to be displayed, is applied to the segment drivers, 24, 25, 26, 27 on a data bus 28. A frame control signal is applied to the command drivers 22, 23 on line FRAME a polarity reversing signal is applied on line DF to the segment drivers 24, 25, 26, 27. A clock signal and a load signal are applied to both the command drivers 22, 23 and the segment drivers 24, 25, 26, 27 on lines CLK and LOAD respectively. Control signals on lines CTRL 1 and CTRL 2 enable and disable the command drivers 22, 23 and the segment drivers 24, 25, 26, 27. The CTRL 1 line is used to enable and disable the second control driver 23 and the third and fourth segment drivers 26, 27, and CTRL 2 line is used to enable and disable the first command driver 22 and first and second segment drivers 24, 25.

The operation of the PDA 1 will now be described.

When the user switches on the PDA 1 by operating the on/off switch 5, the microprocessor 10 performs a boot program, stored in the ROM 11. The boot program launches a first operating program which provides, in the present example, a calculator function. In accordance with the first operating program, the microprocessor 10 outputs commands to the power control circuit 21. The power control circuit 21 responds by energizing the back-lighting light sources in one corner of the display, and applying an enable signal on CTRL 1 and a disable signal on CTRL 2. The microprocessor 10 then transfers display control data to the liquid crystal display control circuit 16 so that the image of a calculator is displayed in the illuminated portion of the LCD panel 3 (see Figure 4A). The user may then perform calculations by touching appropriate regions of the display with the pen 5.

In addition to the image of a calculator, the microprocessor 10 causes the display to include a region labelled "full boot". If a user touches a pen on this region, the microprocessor 10 responds by switching to the second operating program. At the same time, the microprocessor 10 issues a command to the power control circuit 21 which causes it to energize all of the back-lighting light sources and issue an enable signal on CTRL 2 as well. Consequently, the whole display becomes active.

The second operating program is graphical user interface based (GUI-based) operating system providing an environment in which various application programs, e.g. word-processors, spreadsheets etc., may be run. These programs may be preloaded into the ROM 12, or may be loaded from the optional disk drive or an external ROM cartridge connected to the card interface 13.

The arrangement shown in Figure 4 is suitable for a 320 times 128 pixel display. It will be appreciated that the display having a higher resolution may be controlled by increasing the number of command drivers and segment drivers and suitably distributing signals on the CTRL 1 and CTRL 2 lines.

A second embodiment of the present invention will now be described.

Referring to Figures 5 and 6, a PDA 51 comprises hingedly coupled first and second body portions 52, 53. Each body portion is provided with a combined display panel and digitizer tablet 54, 55.

Logically, the panels 54, 55 can be considered to be a single display panel and can be controlled by circuitry as shown in Figure 3. The internal circuitry of the PDA 51 conforms generally to that shown in Figure 2.

When the PDA 51 is switched on in its folded condition, it operates according to a first operating program. The first operating program provides a plurality of functions and ensures that only the required area of the first panel is activated. For instance, a clock function would only require a quarter of the first panel 54, a calculator or diary function would only require one half of the first panel 54 and a simple e-mail function would make use of the whole of the first panel 54.

Should the PDA 51 be unfolded, a switch in the hinge is closed, signalling to the PDA's microprocessor that it must start operating according to a full GUI-based operating system as shown in Figure 6.

The present invention has been described with reference to apparatus wherein user inputs are made using a digitizer tablet and pen. It will be appreciated, however, that other forms of input means may be employed, including touch-sensitive display panels, keypads, keyboards and voice recognition means.

Furthermore, the present invention is not restricted to two "boot" levels and a larger hierarchy of "boot" levels may be employed with the possibility of the levels being passed through in different orders. Different input means may be used at different "boot" levels. For instance, a touch-sensitive display may be used for a simple calculator function but voice recognition used when a full operating system program

is running. The lower boot levels may provide different functions which accumulate. For instance, the lowest level would provide a calculator function and the next provide a telephone book function, whilst continuing to provide the calculator function. In this case, different boot levels would use different area of the display.

An apparatus according to the present invention may be provided with solar cells in a conventional manner. The apparatus may be configured to operate only on power from the solar cells at low "boot" levels and on both power from the solar cells and batteries at higher "boot" levels.

The reader is directed to GB 9625801.7, from which the present application is divided and which relates to a portable computer apparatus having different modes using different display areas.

Claims

1. A portable computer apparatus comprising a display, user input means and processing means operable to display information using the whole of the display and, to reduce power consumption, using only a portion of the display, wherein the processing means is responsive to an operation of the user input means to perform data processing associated with an imaged displayed using said portion of the display when only said portion of the display is being used without causing the whole of the display to be used.

2. An apparatus according to claim 1, wherein the display comprises a back lit liquid crystal display panel and only said portion is lit when only said portion of the display is being used.

3. An apparatus according to claim 1 or 2, wherein the user input means includes a digitizer tablet means and pen.

4. An apparatus according to claim 3, wherein the digitizer tablet means overlies the display.

5. An apparatus according to any one of preceding claim, comprising first and second hingedly coupled body portions wherein the display is distributed between the body portions.